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# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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| Applicant's or agent's file reference<br>HT3930PCT  |  | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)                                    |  |
| International application No.<br>PCT/IB 03/03701  |  | International filing date (day/month/year)<br>03.09.2003   | Priority date (day/month/year)<br>12.09.2002 |
| International Patent Classification (IPC) or both national classification and IPC<br>A41D31/00  |  |  |  |
| Applicant<br>E. I. DU PONT DE NEMOURS AND COMPANY et al.  |  |  |  |
| <p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 4 sheets.</p>  |  |  |  |
| <p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p> |  |  |  |
| Date of submission of the demand<br><br>08.04.2004  |  | Date of completion of this report<br><br>25.10.2004  |  |
| Name and mailing address of the international preliminary examining authority:<br> European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465   |  | Authorized Officer<br><br>Auer, H<br><br>Telephone No. +49 89 2399-2054<br> |  |

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IB 03/03701

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, Pages

1-25 as originally filed

### Claims, Numbers

1-23 received on 20.09.2004 with letter of 17.09.2004

### Drawings, Sheets

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/IB 03/03701**

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).  
*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

|                               |             |      |
|-------------------------------|-------------|------|
| Novelty (N)                   | Yes: Claims | 1-23 |
|                               | No: Claims  |      |
| Inventive step (IS)           | Yes: Claims | 1-23 |
|                               | No: Claims  |      |
| Industrial applicability (IA) | Yes: Claims | 1-23 |
|                               | No: Claims  |      |

**2. Citations and explanations**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/IB 03/03701

To point V:

1. Document WO-A-01/64985 discloses already a heat resistant garment comprising at least first and second fire resistant yarns.  
The problem of the present invention is to achieve a superior heat, flame and electric arc resistance as compared with conventional fabric.  
The solution is in particular given by a fabric such as defined in claim 1 comprising in particular closed adjacent pockets.  
There is no hint for this solution in document WO-A-01/64985 nor in the further documents cited in the search report. These documents contain only prior art.  
Consequently, the subject-matter of claim 1 is novel and involves an inventive step in the sense of Article 33(2) and 33(3) PCT.
2. Claims 2-23 contain further embodiments of the fabric according to claim 1 and fulfill the also the conditions of novelty and an inventive step.

Further comments:

3. The documents cited in the search report are not identified in the description and the relevant background art disclosed therein is not discussed.

## Claims:

1. Heat, flame, and electric arc resistant fabric (1) for use as single or outer layer of protective garments, characterized in that it comprises at least two separate single plies (2,3) each comprising a warp and a weft system, the at least two separate single plies (2,3) being assembled together at predefined positions so as to build closed, adjacent pockets having a side(S1) and a side (S2), the warp and the weft systems of the at least two separate single plies (2,3) being based on materials independently chosen from the group consisting of aramid fibers and filaments, polybenzimidazol fibers and filaments, polyamidimid fibers and filaments, poly (paraphephenylene benzobisaxazole) fibers and filaments, phenol- formaldehyde fibers and filaments, melamine fibers and filaments, natural fibers and filaments, synthetic fibers and filaments, artificial fibers and filaments, glass fibers and filaments, carbon fibers and filaments, metal fibers and filaments, and composites thereof.
2. The fabric (1) according to claim 1, wherein the warp and weft systems of the at least two separate single plies (2,3) are, independently to each other, based on monofilament yarns, multifilament yarns, spun yarns and core spun yarns.
3. The fabric (1) according to claim 1 or 2, wherein the warp and weft systems of the at least two separate single plies (2,3) are, independently to each other, single yarns, twisted yarns and hybrid yarns.
4. The fabric (1) according to claim 3, wherein the warp and weft systems of the at least two single plies (2,3) comprise, independently to each other, single and twisted yarns comprising aramid fibers, aramid monofilaments, aramid multifilaments or composite fibers of aramid and polybenzimidazol.

5. The fabric (1) according to claim 3 or 4, wherein the warp systems of the at least two single plies (2,3) comprise, independently to each other, single and twisted yarns comprising aramid monofilaments or aramid multifilaments, and the weft systems comprise, independently to each other and in an alternate sequence, single or twisted yarns of aramid monofilaments or single or twisted yarns of aramid multifilaments.
6. The fabric (1) according to claim 5, wherein the weft systems of the at least two single plies (2,3) comprise, independently to each other and in an alternate sequence, at least two different single and twisted yarns of aramid filaments.
7. The fabric (1) according to any preceding claim consisting of two separate single plies (2,3).
8. The fabric (1) according to claim 7, wherein the two separate single plies (2,3) comprise aramid fibers chosen from the group consisting of poly-m-phenylenisophthalamid, poly-p-phenylterephthalamid and mixtures thereof.
9. The fabric (1) according to claim 8, wherein one of the two single plies is entirely made of poly-p-phenylterephthalamid.
10. The fabric (1) according to any claim 7 to 9, wherein the two separate single plies (2,3) are made of the same material.
11. The fabric (1) according to any claim 7 to 9, wherein each separate single ply (2,3) is made of a material having a different dimensional thermal shrinkage.
12. The fabric (1) according to any claim 7 to 11, wherein the two separate single plies (2,3) are woven together in such a way that they

cross each other at the predefined positions so that the same side (S1 or S2) of two adjacent pockets is alternately made of the two different separate single plies (2,3).

- 5 13. The fabric (1) according to any one of claims 1 to 12, wherein the closed, adjacent pockets are square shaped.
14. The fabric (1) according to any preceding claim, wherein each side of the pockets is between 5 and 50 mm.
- 10 15. The fabric (1) according to claim 14, wherein each side of the pockets is between 8 and 32 mm.
16. The fabric (1) according to any preceding claim, having a specific weight between 100 g/m<sup>2</sup> and 900 g/m<sup>2</sup>.
- 15 17. The fabric (1) according to claim 16, having a specific weight between 170 and 320 g/m<sup>2</sup>.
- 20 18. The fabric (1) according to any preceding claim, wherein filling yarns are positioned between the at least two separate single plies (2,3).
19. Garment for protection against heat, flames and electric arc comprising a structure made of at least one layer of a fabric (1) according to any one of claims 1 to 18 [19].
- 25 20. The garment according to claim 19, comprising an internal layer, optionally an intermediate layer made of a breathing waterproof material, and an outer layer made of the fabric according to any claim 1 to 18.
- 30 21. The garment according to claim 19 or 20, wherein the fabric (1) is made of two separate single plies (2,3), the former being positioned

internally and the latter externally in the structure of the garment, the dimensional thermal shrinkage of the internally positioned separate single ply being lower than that of the externally positioned separate single ply.

- 5 22. The garment according to claim 21 wherein the two separate single plies comprise poly-p-phenylterephthalamid, the internally positioned ply comprising at least the same amount of poly-p-phenylterephthalamid as the externally positioned ply.
- 10 23. The garment according to claim 22 wherein the internally positioned ply is entirely made of poly-p-phenylterephthalamid.